

CLAIM LISTING

1. (Currently Amended) An interconnect apparatus comprising:
a silicon substrate;
contact pads processed on the silicon substrate to connect to an integrated circuit (IC) die;
interconnections selectively interconnecting the contact pads, the interconnections
monolithically processed on the silicon substrate; and
circuit elements monolithically processed on the silicon substrate in the same plane as
the interconnections with the same processing as the contact pads and the interconnections, the
circuit elements to interoperate with the IC die.
2. (Original) An interconnect apparatus according to claim 1, wherein the circuit elements comprise a micro electro-mechanical system (MEMS) device.
3. (Original) An interconnect apparatus according to claim 2, wherein the MEMS device further includes a microfluidic system.
4. (Original) An interconnect apparatus according to claim 2, wherein the MEMS device further includes an actuation circuit device.
5. (Original) An interconnect apparatus according to claim 1, wherein the circuit elements comprise a sensor circuit.
6. (Original) An interconnect apparatus according to claim 1, wherein the silicon substrate comprises a high-resistivity silicon substrate.
7. (Original) An interconnect apparatus according to claim 6, wherein the circuit elements comprise optical circuit components.
8. (Original) An interconnect apparatus according to claim 1, wherein the circuit elements comprise an active circuit element.

9. (Original) An interconnect apparatus according to claim 1, further comprising a cap processed onto the silicon substrate to hermetically isolate circuit elements on the silicon substrate.
10. (Original) An interconnect apparatus according to claim 9, wherein the cap comprises a cap of silicon-based material.
11. (Original) An interconnect apparatus according to claim 9, further comprising interconnect vias manufactured in the cap to provide electrical connectivity to contact pads on the silicon substrate.
- 12-18. (Canceled)
19. (**Currently Amended**) An integrated circuit chip having a circuit element on a substrate created with a first lithographic processing interconnected on a ~~high-resistivity~~ silicon interconnect substrate having functional circuit elements monolithically embedded in the interconnect substrate in the same plane as interconnecting elements, created by the process of:
- processing contact pads and electrical traces monolithically on the silicon substrate with a second lithographic processing to interconnect the circuit elements;
- processing the functional circuit elements monolithically on the interconnection substrate with the second lithographic processing, to create the circuit elements in the same plane as the contact pads and electrical traces;
- processing a micro electro-mechanical system (MEMS) device monolithically on the interconnection substrate with the second lithographic processing; and
- interconnecting the circuit element of the first lithographic processing on the separate substrate to contact pads on the interconnection substrate to interconnect the circuit element of the first lithographic processing with the functional circuit elements of the second lithographic processing.
20. (Canceled)

21. (Original) An integrated circuit chip according to claim 19, wherein the circuit elements comprise an active circuit element.

22. (Original) An integrated circuit chip according to claim 19, wherein the circuit elements on separate substrates comprise circuit elements all on silicon substrates.

23. (Original) An integrated circuit chip according to claim 19, wherein the silicon interconnect substrate further comprises a silicon lid to hermetically seal functional circuit elements.

24. (Original) An integrated circuit chip according to claim 23, wherein the lid further comprises interconnections through the lid to interconnection contact pads on the silicon interconnect substrate.

25-28. (Canceled)

29. (Original) An electronic system comprising:

a chip with an integrated circuit (IC) bonded to contact pads on a silicon interconnect backplane, the silicon backplane having integrated circuits including a micro electro-mechanical system (MEMS) device processed into the silicon backplane with the same processing used to create the contact pads, the processing different from a processing used to create the IC; and
a direct current power storage cell coupled with the chip to supply power to the chip.

30. (Original) A system according to claim 29, wherein the MEMS device further includes a microfluidic system.

31. (Original) A system according to claim 29, wherein the MEMS device further includes an actuation circuit device.

32. (Original) A system according to claim 29, wherein the circuit elements comprise sensor circuits.

33. (Original) A system according to claim 29, further comprising a cap processed onto the silicon backplane to hermetically isolate circuit elements on the silicon backplane.

34. (Original) A system according to claim 33, wherein the cap comprises a cap of silicon-based material.

35. (Original) A system according to claim 33, further comprising interconnections manufactured through the cap to provide electrical connectivity to contact pads on the silicon backplane.